OBSERVATIONS ON *LIPHYRA BRASSOLIS* WESTWOOD (LEPIDOPTERA: LYCAENIDAE) IN NORTH QUEENSLAND

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Abstract

Larvae of *Liphyra brassolis* Westwood (Lepidoptera: Lycaenidae) are recorded feeding upon larvae of *Oecophylla smaragdina* F. (Hymenoptera: Formicidae). Descriptions are given of early instar larvae together with brief comments on habitat, larval abundance and adult morphology.

Introduction

Since the discovery of the larvae of *Liphyra brassolis* in the arboreal nests of *Oecophylla smaragdina* (Dodd, 1902) very little has been published on the life history of this fascinating insect. In his original account, Dodd observed a large larva of *L. brassolis* sieze a larva of *O. smaragdina* but he disturbed the *L. brassolis* larva before it could feed. Subsequent publications listing *L. brassolis* have presumed the larvae to be carnivorous on the intermediate stages of *O. smaragdina* on the basis of this single observation. (Waterhouse and Lyell, 1914; Waterhouse, 1932; Common and Waterhouse, 1981).

Further weight was given to this assumption by Chapman (1902) when he described the mouthparts of larval *L. brassolis* as piercing type mandibles within a suctorial tube formed by labium, maxillae and labrum.

Early instar larvae have not subsequently been encountered or described. The description of one by Chapman (1902) was not of a larva of *L. brassolis* but of a moth larva, most probably *Cyclotorna monocentra* (Cyclotornidae). Dodd (1903) had inadvertently included the small moth larva with the samples of *L. brassolis* larvae sent for description.

In June and July 1985, in a search of two locations in north Queensland, the authors located all the intermediate stages of *L. brassolis* and successfully reared several large larvae in the laboratory.

Field observations

On 14th June a search was made of *O. smaragdina* nests in a disused citrus orchard of more than 150 trees at Dallachy creek 20 km north of Cardwell, where larvae of *L. brassolis* were known to occur (H. Bosworth, pers. comm.). Twenty-three final instar larvae and one pupa were taken, of which all but one larva were confined to trees at one end of the orchard. A peripheral tree on the corner of this area contained 14 larvae with a maximum of 6 in one nest.

Waterhouse (1932) recorded pupal exuviae on Great Palm Island near Ingham and as extensive citrus orchards were known to have been established on the island, a search was undertaken on 15th July. Only a few scattered

remnants of the original orchards remained, and one area comprising ten stunted trees infested with *O. smaragdina*, contained a substantial breeding colony of *L. brassolis*. Intermediate stages of *L. brassolis* were present in five trees with the majority being found in only two trees.

One tree with five ant nests contained a total of twenty-seven final instar larvae, pupae and fresh pupal exuviae as well as two first instar larvae. A second small tree had two ant nests, one of which was devoid of ant brood but contained two cast larval skins of *L. brassolis*. The second nest had a few ant larvae and pupae and contained eight small pupae, four final instar and two first instar larvae of *L. brassolis*.

Another small tree had a single small ant nest devoid of ant larvae and pupae and within which were a cast larval skin and a dead advanced larva of *L. brassolis*. Numerous eggs, in groups of up to six, were present on the undersides of exposed sections of trunk and branches of several trees. The distribution of larvae between nests is shown in fig. 1.

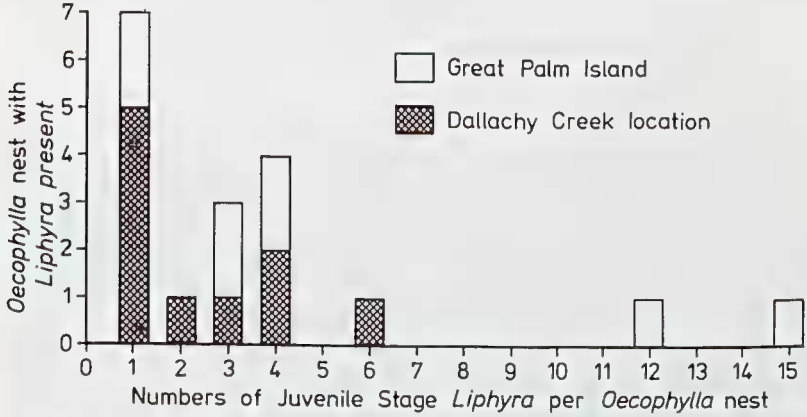


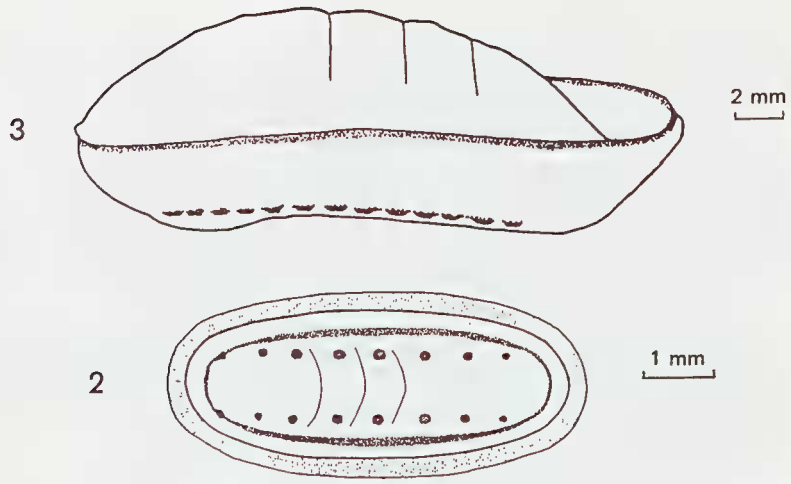
Fig. 1. Density of *Liphyra brassolis* larvae in nests of *Oecophylla smaragdina*.

First instar larva (Fig. 2)

Oval shaped, 6 mm long and 4 mm wide and flattened. Dorsum yellow with dorsolateral lines of 7 reddish spots and medially 3 transverse grooves. A concentric pair of reddish brown submarginal lines. Marginal fringe white, composed of thin, radially arranged chords with club shaped ends forming a finely sculptured edge and capable of close appression to leaf surface. Ventral surface white, bearing mid ventrally, the head, thoracic legs and abdominal prolegs.

Second instar larva

Similar to first instar but colour becoming brownish yellow and marginal fringe thickened and reddish brown in colour. Length 10 mm and width 6 mm.



Figs 2, 3. First instar larva and prepupa of *Liphyra brassolis.*

Prepupa (Fig. 3)

Resembling final instar larva but becoming swollen and convex anteriorly while retaining the upturned posterior margin. Duration 5-6 days after which posterior surface expands dorsally. Pupal duration at a constant temperature of 25 degrees C. ranged from 27-32 days and at room temperature at Townsville was 30-46 days. The egg was described by Waterhouse and Lyell (1914) and the final instar larva and pupa by Chapman (1902).

Laboratory observations

Larvae returned to the laboratory were introduced into transparent plastic cylinders containing small colonies of *O. smaragdina.* Most wandered within the cage for 24-48 hours before either pupating or commencing to feed. The *L. brassolis* larvae that fed, located and remained in close proximity to aggregations of ant larvae and pupae attended by adult ants.

When foraging, the *L. brassolis* larvae located ant larvae with their antennae and larger prey were given a light coating of silk. The prey was then grasped by the tarsal claws of the thoracic legs, withdrawn under the projecting rim and held along the ventral midline so that one end of the prey was presented to the mouthparts (Fig. 4). The ant larva was then consumed by vigorous chewing of the mandibles combined with a pharyngeal suction to ingest liquid contents. In most cases the prey larva was entirely consumed but with an occasional large prey larva a small remnant was discarded.

Small ant larvae were eaten either singly or in adherent clusters by being seized in the mouthparts without the use of the forelegs. Only ant larvae were eaten; ant pupae when encountered were rejected by being pushed to one side with the head.

Adult

Adult males emerging from pupae from both locations exhibit extensive melanic colouration of the upperside and underside of both fore and hind wings. Females have slightly broader dark margins to the wings and more prominent dark cell spots on the hind wings. An adult male from Townsville taken in January and a female from Darnley Island in May have the more extensive orange areas on all wings normally associated with *L. b. major.*

Discussion

In both habitats, *L. brassolis* larvae were found in *O. smaragdina* nests in citrus trees growing in a cleared area in open forest and riverine rainforest. It has been the experience of the authors and others (H. Bosworth and J. Young pers. comm.) that larvae are more often encountered in ant nests in single isolated trees. It is not thought that female *L. brassolis* are attracted to citrus trees but Lokkers (1982) in a study of the behavioural ecology of green tree ants, at Townsville, discovered that ants are more likely to occupy areas of higher tree density. It is possible that orchards provide an appropriate tree density for the development of successful colonies of *O. smaragdina.*

In both locations the *L. brassolis* larvae were confined to only a few ant nests in some of the available infested trees. The exceptional numbers of larvae in two of the nests at Great Palm Island had undoubtedly resulted

Fig. 4. Mature larva of *L. brassolis* ingesting a larva of *O. smaragdina.*

from larval congregation at diminished food supply. No explanation can be given for the spatial distribution of *L. brassolis* larvae between trees. Within some trees the presence of *L. brassolis* larvae in a particular ant nest appeared to be determined by the position of the nest relative to the oviposition site. The feeding and successful rearing of numerous larvae of *L. brassolis* on larvae of *O. smaragdina* confirms the original suspicions of Dodd. The finding of first instar larvae within ant nests would indicate that all larval instars feed upon ant larvae. The finding of a dead larva in a nest devoid of ant larvae and stunted pupae in nests almost exhausted of ant larvae would indicate that *L. brassolis* larvae have an exclusive diet of *O. smaragdina* larvae.

The postulation by Chapman (1902) that *L. brassolis* larval mouthparts were suctorial was an accurate interpretation. When the mandibles are retracted beneath the labrum, the broad cardines of the maxillae close the preoral cavity laterally from labrum to labium. The circular orifice thus formed is well adapted to enclose the end of cylindrical prey larvae. The dentate mandibles are effective cutting and chewing appendages enabling ingestion of the cuticle of prey larvae.

Waterhouse and Lyell (1914) described *L. b. melania* based on 3 dark males from the Northern Territory but it is now known that there is no geographical basis to this colour form. Examination of more specimens from summer generations may indicate if there is any seasonal basis to this melanic colouration.

Acknowledgements

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